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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/163,199	09/30/1998	HITOSHI FUKUSHIMA	04783/026001	9722

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EXAMINER

EPPERSON, JON D

ART UNIT	PAPER NUMBER
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1639

DATE MAILED: 02/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/163,199

Applicant(s)

FUKUSHIMA ET AL.

Examiner

Jon D Epperson

Art Unit

1639

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 November 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,7 and 8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,7 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Please note: There is a change in Examiner handling prosecution in this case from Maurie Baker to Jon Epperson.

Request for Continued Examination (RCE)

1. A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 3, 2003 has been entered. Claims 1, 7 and 8 were pending. Applicants' amended claim 1. No claims were added or canceled. Therefore, claims 1, 7 and 8 are still pending and active. An action on the merit follows.

Those sections of Title 35, US code, not included in the instant action can be found in previous office actions.

Withdrawn Objections/Rejections

2. All outstanding objections and/or rejections are withdrawn in view of Applicants' arguments and/or amendments.

New Rejections

Claims Rejections - 35 U.S.C. 112, second paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

Art Unit: 1639

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1, 7 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A. For **claim 1**, the phrase “an electro-conductive polymer absorbing aromatic molecules” is vague and indefinite. For example, it is not clear if the electro-conductive limitation refers to the polymer or the aromatic molecules? Applicants are requested to clarify and/or correct. Therefore, claims 1 and all dependent claims are rejected under 35 U.S.C. 112, second paragraph.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1, 7 and 8 are rejected under 35 U.S.C. 112, first paragraph, because the specification while being enabled for a method of inkjet printing wherein the solutions used in the dispensing step have a minimum surface tension that is about $35 \text{ mN} \cdot \text{m}^{-1}$ (see below) is not enabling for dispensing any solution. In addition, the claimed invention is not enabling for any print head because a special “solvent-resistant” print head is essential to the method (see below). This is an enablement rejection.

There are many factors to be considered when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement and whether any necessary experimentation is “undue”. These factors may include, but are not limited to:

- (1) the breadth of the claims;
- (2) the nature of the invention;
- (3) the state of the prior art;
- (4) the level of one of ordinary skill;
- (5) the level of predictability in the art;
- (6) the amount of direction provided by the inventor;
- (7) the existence of working examples; and
- (8) the quantity of experimentation needed to make or use the invention based on the content of the disclosure.

See *In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988).

(1-2) Breadth of the claims and nature of the invention: The scope of the claim is broad because Applicants’ claimed method uses “comprising” terminology that includes dispensing an infinite number of solutions with very different chemical properties e.g., different viscosities and surface tensions. Furthermore, applicants’ claims do not place any limits on the types of materials that are used to make the inkjet nozzles.

(3 and 5) The state of the prior art and the level of predictability in the art: The prior art teaches that inkjet printers will not dispense liquids that are less than about $35 \text{ mN}\cdot\text{m}^{-1}$ reproducibly (e.g., see Calvert, page 3299, column 2, paragraph 2, “The surface tension should not be lowered ... because this leads to ... wetting the faceplate around the [inkjet] nozzles and also prevents formation of a stable droplet stream. The minimum surface tension is about $35 \text{ mN}\cdot\text{m}^{-1}$ ”; see also column 1, last paragraph, “viscosity and surface tension are crucial parameters [i.e., critical to the invention]”) (Calvert, P. “Inkjet

Art Unit: 1639

Printing for Materials and Devices” *Chem. Mater.* **2001**, *13*, 3299-3305). The prior art also teaches that a “special solvent-resistant print head” is essential for printing conducting polymers (e.g., see Calvert, page 3300, “Conducting Polymer” section, “Printing these solutions [i.e., printing conducting polymers] required a special solvent-resistant print head”). In this regard, it is noted that claims which lack critical or essential subject matter, which is necessary to the practice of the invention, but is not included in the claim(s), including essential structure, is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976); and *Ex Part Bhide* (Bd Pat. App. & Int.) 42 USPQ2d 1441.

(4) The level of one of ordinary skill: The level of skill required would be high, most likely at the Ph.D. level.

(6-7) The amount of direction provided by the inventor and the existence of working examples: Applicants do not provide any teachings that would enable a person of skill in the art to dispense liquids that have a minimum surface tension that is less than about 35 mN•m⁻¹. In addition, Applicants do not provide any guidance (or working examples) on how to use materials in the inkjet print head that would be dissolve and/or react with the solvents used.

(8) The quantity of experimentation needed to make or use the invention based on the content of the disclosure: The Examiner contends that the quantity of experimentation needed to make and or use the invention would be great because the cited reference (i.e., Calvert) provides evidence that the claimed invention will not work with solutions that are less than about 35 mN•m⁻¹ (see sections 3, 5-7 above). In addition, Applicants have

Art Unit: 1639

omitted essential subject matter (see sections 3, 5-7 above). Note that there must be sufficient disclosure, either through illustrative examples or terminology, to teach those of ordinary skill how to make and use the invention as broadly as it is claimed. *In re Vaeck*, 947 F.2d 488, 496 & n.23, 20 USPQ2d 1438, 1445 * n.23 (Fed. Cir. 19991).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sangodkar et al (Sangodkar, H.; Sukeerthi, S.; Srinivasa, R.S.; Lal, R.; Contractor, A.Q. "A Biosensor Array Based on Polyaniline" *Anal. Chem.* **1996**, 68, 779-783) and Lemmo et al

Art Unit: 1639

(Lemmo, A.V.; Fisher, J.T.; Geysen, H.M.; Rose, D.J. "Characterization of an Inkjet Chemical Microdispenser for Combinatorial Library Synthesis" *Anal. Chem.* **1997**, 69, 543-551) and Newman et al (Newman; J.D.; Turner, A.P.F. "Ink-jet printing for the fabrication of amperometric glucose biosensors" *Analytica Chimica Acta*, **1992**, 262, 13-17) (IDS Ref. AR).

For *claim 1*, Sangodkar et al (see entire document) teach the manufacture of a biosensor array based on polyaniline, which reads on claim 1. For example, Sangodkar et al teach the deposition of a polyaniline electro-conductive polymer thin film on the surface of an array of gold interdigitated microelectrodes on oxidized silicon wafers, which reads on claim 1 (e.g., see Sangodkar et al, abstract; see also figures 1-3 wherein the "two dimensional array" of IMPs are disclosed in figure 2 and the method for depositing the polyaniline thin film is shown in figure 3). Please note that the polyaniline conducting film is deposited in different regions of the two-dimensional sensor array (e.g., see figure 2) to produce a device that is specific to a group of chemicals (e.g., see abstract wherein it is shown that the device is specific for a group of chemicals including glucose, urea and triolein).

With respect to the limitation that the solution has a viscosity "of about 3 centipoise or less", it is noted that "[p]roducts of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Since the reference discloses a

Art Unit: 1639

solution comprising applicants preferred “polyaniline” (e.g., see specification, page 7, line 12), this solution is deemed to have the properties applicants claim. “When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.” *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The Office does not have the facilities to make such a comparison and the burden is on the applicants to establish the difference. See *In re Best*, 562 F.2d 1252, 195 USPQ 430 (CCPA 1977) and *Ex parte Gray*, 10 USPQ 2d 1922 1923 (PTO Bd. Pat. App. & Int.).

For *claim 8*, Sangodkar et al disclose poly-silicon thin film transistors (e.g., see Sangodkar et al, abstract, see also figure 2).

The prior art teachings of Sangodkar et al differ from the claimed invention as follows:

For *claim 1*, Sangodkar et al are deficient in that they do not teach the use of inkjet technology to deposit the electro-conductive polymer. Sangodkar et al only teach the use of electrochemical deposition using a syringe (e.g., see Sangodkar et al, figure 3).

For *claim 7*, Sangodkar et al are deficient in that they do not teach the use of a plastic substrate.

However, the combined teachings of Lemmo et al and Newman et al disclose the following limitations that are deficient in Sangodkar et al:

For *claim 1*, Lemmo et al (see entire document) teach the use of inkjet technology for the formation of combinatorial libraries including applications to biosensors (e.g., see Lemmo et al, abstract; see also page 544, column 1, paragraph 2, “Inkjet-type dispensing

... have been used in many areas of chemistry ... including fabrication of biosensors").

Furthermore, Lemmo et al teach that piezoelectric devices may be used in the inkjet dispenser (e.g., see Lemmo, page 544, column 1, paragraph 2, "Inkjet-type dispensing, both solenoid and piezoelectric, have been used") and explicitly refers to Newman et al as an example of a piezoelectric Inkjet dispenser (e.g., see Lemmo et al, page 544, column 1, reference 2 at bottom of column). Newman et al teach an ink jet nozzle with a piezo-electric device for ejecting solution wherein an electric signal is used to deform the piezo-element (e.g., see Newman et al, page 14, column 1, "Ink-jet nozzle" section; see also figure 1).

For *claim 7*, the combined teachings of Lemmo et al and Newman et al disclose a plastic substrate (e.g., see Newman et al, page 14, column 1, last paragraph wherein PVC is used as a substrate to make the electrodes).

It would have been obvious to one skilled in the art at the time the invention was made to make a biosensor array based on electro-conductive polyaniline polymer as taught by Sangodkar et al with the inkjet technology as disclosed by the combined teachings of Newman et al and Lemmo et al because Lemmo et al explicitly states that inkjet technology is beneficial for producing combinatorial libraries for biosensors, which would encompass the biosensor disclosed by Sangodkar et al i.e., the references represent analogous art (e.g., see Lemmo et al, page 544 teach that his apparatus is useful in making material libraries like the one disclosed by Sangodkar et al (see Lemmo et al, page 544, column 1, paragraph 2, "Inkjet-type dispensing, both solenoid and piezoelectric, have been used in many areas of chemistry and science including

fabrication of biosensors”). Furthermore, one of ordinary skill in the art would have been motivated to use the inkjet technology as taught by the combined teachings of Newman et al and Lemmo et al because according to Lemmo et al explicitly states that they have advantages over the syringe based dispensing techniques disclosed by Sangodkar et al (see Lemmo et al, page 544, column 1, paragraph 2, “The use of inkjet-type dispenser for delivering chemical reagents has several distinct advantages over syringe or pump-based pipet dispensing: (1) The dispense process is a noncontact dispense ... (2) The dispense time is rapid ... (3) ... the mean time between failure is high ... (4) low cost”).

Furthermore, one of ordinary skill in the art would have reasonably expected to be successful because Lemmo et al explicitly states that inkjet technology can be successfully used to replace the syringe based methods disclosed in Sangodkar et al (e.g., see Lemmo et al, page 544, column 1, paragraph 2).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jon D Epperson whose telephone number is (571) 272-0808. The examiner can normally be reached Monday-Friday from 9:00 to 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Andrew Wang can be reached on (571) 272-0811. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1235.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Art Unit: 1639

Jon D. Epperson, Ph.D.

February 6, 2004

BENNETT OPTICAL
FEBRUARY 17 2004

